

NON-PUBLIC?: N
ACCESSION #: 9311120231
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Davis-Besse, Unit No. 1 PAGE: 1 OF 4

DOCKET NUMBER: 05000346

TITLE: Reactor Trip Due to Momentary CRD Trip Confirm Signal
EVENT DATE: 10/08/93 LER #: 93-005-00 REPORT DATE: 11/08/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Dale L. Miller, Sr. Engineer - TELEPHONE: (419) 321-7264
Licencing

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: AA COMPONENT: JX MANUFACTURER: X999
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On October 8, 1993, at 0843 hours, with Control Rod Drive (CRD) trip breaker testing in progress, the reactor tripped from 97 percent Rated Thermal Power (RTP). The trip was initiated by a momentary CRD Trip Confirm signal which caused the Integrated Control System (ICS) to initiate the Rapid Feedwater Reduction (RFR) and Main Feedwater Block Valve (MFWBV) closure. This resulted in feedwater flow being reduced by approximately forty percent while the Reactor was still at full power. The feedwater flow upset caused the Reactor Coolant System (RCS) pressure to increase rapidly until it reached the high pressure trip setpoint where the Reactor Protection System (RPS) tripped the reactor. The post-trip response of the plant was normal with no major problems.

The momentary CRD Trip Confirm Signal was caused by a degraded power supply in the CRD System Logic Cabinet No. 1. Excessive Alternating Current (AC) ripple on the Direct Current (DC) power supply output caused

a CRD logic protection circuit to change state and actuate the CRD Trip Confirm Signal. The degraded power supply and CRD logic protection circuit were replaced prior to restart.

END OF ABSTRACT

Table "Required Number of Digits/Characters For Each Block" omitted.

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Description of Occurrence:

On October 8, 1993, at 0843 hours, with the Control Rod Drive System, (CRD-AA) trip breaker testing in progress, the Reactor tripped from 97 percent Rated Thermal Power. The surveillance test procedure Channel Functional Test of Reactor Trip Breaker A (DB-MI-03012) was being performed. A CRD Trip Confirm alarm actuated for a time duration of approximately 800 msec. The momentary actuation of CRD Trip Confirm logic circuitry sent a signal to initiate the RFR Circuit and a signal to initiate closure of both Main Feedwater Block Valves. After a reduction of approximately forty percent feedwater flow to the Steam Generators, Reactor Coolant System (RCS-AB) pressure increased to the Reactor Protection System (RPS-JC) high pressure trip setpoint (of less than or equal to 2355 psig). RPS channels two and four tripped which initiated the Reactor trip. The post trip response was normal with RCS pressure, RCS temperature, Pressurizer level, Steam Generator pressure and Steam Generator level remaining within acceptable ranges.

Initial notification to the NRC of the reactor Trip was made on October 8, 1993, at 0957 hours, in accordance with 10CFR50.72(b)(2)(ii). This LER is being submitted in accordance with 10CFR50.73(a)(2)(iv).

Apparent Cause of Occurrence:

The initiating event was a momentary CRD Trip Confirm signal which caused initiation of RFR and initiated closure of both Main Feedwater Block Valves. This was detected by an on-line monitoring and data logging system. The CRD Trip Confirm logic is powered by a 24 volt DC power supply. A logic interlock circuit exists in the circuit between the power supply and the CRD Trip Confirm logic circuit which monitors voltage supplied to the CRD logic modules. The logic interlock is designed to prevent undesirable control rod motion on a failure of power to the CRD logic modules by removing 24 volt DC control and indicating power.

The power supply was found to have an AC ripple superimposed on the 24 volt DC output. The characteristic of the ripple was a 6 volt peak to

peak saw tooth wave form with the positive halfwave of the ripple clipped down by approximately 1 volt. Troubleshooting of the power supply and the logic interlock circuit on the bench revealed that the 1 volt clipping of the ripple could be eliminated by increasing the load on the power supply.

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Apparent Cause of Occurrence (continued):

During performance of DB-MI-03012, CRD Trip Breaker A was opened and subsequently reclosed. Closing the breaker caused the load on the power supply to increase which caused less clipping of the ripple. A unijunction transistor within the logic interlock momentarily changed state when the ripple cycled to a more positive voltage. As a result, a relay on the output of the logic interlock circuit was momentarily deenergized which caused indicating and control power to be removed from the CRD Trip Confirm Logic. Removal of power initiated RFR and closure of both MFWBVs as designed. The power supply and the logic circuit were both installed during original construction.

Analysis of Occurrence:

The event reported in this LER has minimal safety significance.

Plant and operating crew response to the trip was satisfactory. The CRD trip breakers opened and all safety and regulating control rods inserted following the reactor trip as designed. Steam generator pressure increased due to the closing of the Main Turbine Stop Valves. The Turbine Bypass Valves and the Atmospheric Vent Valves (AVVs) properly opened and the Main Steam Safety Valves (MSSVs) lifted in response to the increasing secondary system pressure. The MSSVs and AVVs closed as Steam Generator outlet pressure decreased. No Engineered Safety Feature Systems were challenged.

Corrective Action:

The degraded 24 volt DC power supply and the logic interlock circuitry were replaced. Bench testing verified the failure mode discussed above. The power supplies in the CRD System Logic cabinets were checked to ensure they were performing acceptably.

The Channel Functional Test of Reactor Trip Breaker procedures will be revised to incorporate preventive actions that would preclude initiation of RFR and closure of MFWBVs as a result of a CRD Trip Confirm signal during these tests. Procedure alterations will be completed by November

12, 1993.

In addition, enhancement to the CRD System is being evaluated which would validate actuation of CRD Trip Confirm with a low reactor power signal prior to initiating RFR and MFWBV closure.

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Failure Data:

LER 89-033 reported a reactor trip as a result of a spurious CRD Trip Confirm and the resultant reduction in feedwater. A CRD Trip Confirm was the initiating signal in the previous occurrence. However, there was no evidence of a power supply failure or actuation of the logic interlock during the previous event.

NP-33-93-05 PCAOR No. 93-0455

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TOLEDO
EDISON

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AB-93-0042
NP-33-93-05

Docket No. 50-346

License No. NPF-3

November 8, 1993

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Gentlemen:

LER 93-005
Davis-Besse Nuclear Power Station, Unit No. 1

Date of Occurrence - October 8, 1993

Enclosed please find Licensee Event Report 93-005, which is being submitted to provide 30 days written notification of the subject occurrence. This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(iv).

Very truly yours,

John K. Wood
Plant Manager
Davis-Besse Nuclear Power Station

JKW/amb

Enclosure

cc: Mr. J. B. Martin
Regional Administrator
USNRC Region III

Mr. Stan Stasek
DB-1 NRC Sr. Resident Inspector

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